

Reading the River, Summer 2006

“If it is on the ground it is in the water!”

Grades 9-12  
Earth Space Science

Carol Ann Compton  
Lawrence County High School  
Lawrence County Schools  
Lawrence County, Kentucky

July 18, 2006

## **Title of Curriculum: “If it is on the ground it is in the water!”**

### **Context of Curriculum Product:**

This lesson will be a culminating project after studying the water cycle and watersheds. The water cycles sessions will include the rainwater to groundwater to evapotranspiration processes with attention given to air and surface pollutions sources. The watershed portion will include how rivers form, erosion and the connections between fresh water and ocean water.

**Objective:** Students will be able to explain how various materials such as garbage, etc. affect the groundwater and why it does so.

### **Program of Studies and core content addressed:**

S-HS-SI-2 - design and conduct different kinds of scientific investigations for a wide variety of reasons.

improve skills regarding ability to design and conduct increasingly complex investigations independently (e.g., increase number of samples/trials, increase duration, improved reporting).

S-HS-SI-3 - use equipment (e.g., microscopes, lasers), tools (e.g., beakers), techniques (e.g., microscope skills), technology (e.g., computers), and mathematics to improve scientific investigations and communications.

recommend and utilize correct equipment, tools, skills, technology, and mathematics to be used in various investigations.

S-HS-ESS-6 - analyze Earth's chemical reservoirs and recognize that each element can exist in several reservoirs (e.g., carbon in carbon dioxide reservoirs and carbonate reservoirs).

analyze the Earth's chemical reservoirs and investigate that each element can exist in several reservoirs (e.g., carbon in CO<sub>2</sub> and Carbonate reservoirs, Carbon cycle of photosynthesis and respiration and nitrogen cycle). (research, report, presentation)

SC-H-2.2.1 - recognize that Earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different reservoirs. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of geochemical cycles.

**Materials needed:** Textbook or other printed material containing information on the water cycle, pH, dissolved oxygen and conductivity and microorganisms found in water.

Test kits for pH and dissolved oxygen

Conductivity meter

Water from each student's water supply source

Hot plate

Beakers

Microscopes

Various additives found on the surface of the ground at various times. Suggested materials would include: gravel, decaying leaves, garden soil, fertilizer, old motor oil, storm water from streets, garbage, litter, cigarette butts, and ashes, gasoline, soap from car wash discharge, barnyard runoff, fly ash(AEP byproduct), rain water from industrial site areas (Armco Steel, gravel quarry, Ashland Oil etc.) . Student suggestions should be solicited as well.

**Activity Procedure:** Each student will test their water supply source as it is for pH, dissolved oxygen, conductivity and dissolved solids using the kits and meters. Microscopes will be use to observe any microorganisms in the water  
Other samples of the original water supply will be mixed with at least three different materials the student identifies as being on the ground around their supply source. Each sample will be mixed in a separate beaker. The mixed samples will be tested just after mixing and the results recorded. The samples will be labeled carefully and allowed to sit at room temperature for twenty four hours and tested a second time. A third test will be made at the end of 1 week for each of the parameters. The data will be analyzed and conclusions drawn as to the effect each material had on the water.

**Enrichments:** Tune “Something in the water” could be played during the activity and students may want to sketch the layout of their water source environment. An additional activity may be added using the Asian clams to investigate how they would affect the week old samples of water.

**Handouts:** A data sheet with columns for each of the test and rows for each substance mixed and the contact time will be generated at the beginning of the activity.

**Definition/Explanation of concepts/skills taught in lesson:** Every water supply is subject to changes from materials it contacts and releases. Students need to realize the affect their own activities have on water. Contact time is an important part of the impact on how a water source changes with each material. This activity will involve each student in their own water’s changes. Concepts of what each parameter of water means to plant and wildlife as well as human beings will be examined. Skills needed for making each test will be learned or reviewed.

**Method to assess stated objectives:** Students will prepare a lab report of their work which will include an analysis of the data they acquire.

**References:** The Reading the River 2006 notebook, textbook used in Earth Space Science (Modern Earth Science, Sager et al, Holt, Rinehart and Winston)